Takeover Bids, Share Prices, and the Expected Value Hypothesis

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AND THE EXPECTED VALUE HYPOTHESIS

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ABSTRACT

This paper examines the relationship between the price bid for a takeover target, the probability of the bid succeeding and the target’s price over the course of the bid. We test and reject Samuelson and Rosenthal’s (1986) expected value hypothesis. We find that over the bid, the price of the target of a successful bid typically rises towards the bid price, but is not observed to converge with the bid price. This lack of observed convergence appears to be due to an early cessation of trading in many of the bids that succeed. In the case of bids that fail, the target’s share price is typically observed to rise above the bid price early in the bid. We consider several explanations for this, and suggest that the expectation of a subsequent bid is the most plausible explanation. This is supported by our empirical evidence. We also find that in the cases where the bids fail, early cessation of trading did not occur in the majority of cases.
1. Introduction

There is considerable evidence that companies subject to takeover bids experience substantial revaluation. Most of this evidence comes from event studies which examine abnormal returns around takeover announcements. Generally targets of takeovers have been found to earn excess returns around the announcement of the bid. This applies to both the targets of bids that succeed and bids that fail.

This paper also studies the revaluation accompanying takeover bids, but the focus and methodology differs from the event study excess return literature. Using the Expected Value Hypothesis (EVH) of Samuelson and Rosenthal (1986) as a theoretical framework, this paper examines the link between the price bid for the target, the probability of success of the takeover offer and changes in the target’s share price. Using Australian data, we test the EVH and examine the following questions. Does an increase in the share price of takeover targets indicate an increase in the probability of the bid succeeding? In addition to the bid price and the probability of the bid succeeding, what other factors play a role in the determination of the target’s price? For example, what is the impact if subsequent bids are anticipated? The paper also suggests that for many bids, trading activity ceases well before the end of the bid.

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The time dimension over which price movements are examined is from the date of the bid announcement until the date the outcome of the offer is publicly known.\textsuperscript{2} We call this the bid period. During this period, it is hypothesised that the extent and speed of the revaluation will be affected by the probability of success of the offer. For example if, on announcement, the market judges the success of a full takeover bid to be certain, and this had not been anticipated, the share price would be expected to increase immediately to the present value of the offer price. In general, for the targets of successful takeover offers,\textsuperscript{3} the share price would be expected to be revised upwards during the bid period, converging with the offer price at, or before, the end of the bid period. For targets of offers that fail, Samuelson and Rosenthal (1986) hypothesise that the share price falls during the bid period, reflecting a reduced probability of bid success.\textsuperscript{4}

This study examines the share prices of a sample of 91 Australian takeover targets: 75 successes and 16 failures.\textsuperscript{5} The average price of the successes increased gradually during the bid period. However, the expected convergence with the bid price at or near the conclusion of the bid period did not occur, possibly due to an

\textsuperscript{2} The outcome date is typically when the bid is made unconditional, or when the bidding firm makes an announcement at the close of the bid.

\textsuperscript{3} Henceforth, those targets for which the bid succeeded will be termed 'successes' and those for which the bid failed 'failures.'

\textsuperscript{4} The presumption is that the price relies on the bid for support and that therefore the price will drop if the bid closes unsuccessfully. As discussed subsequently, Bradley (1980) argues that this is not the case.

\textsuperscript{5} In general, a substantial majority of bids succeed, and therefore it is consistent that there are substantially more successes than failures in our sample.
early cessation of trading for most of the successes. For the failures, the average price exceeded the offer price within a few days of the bid announcement, and remained above the offer price for virtually all of the offer period. Several explanations for this price behaviour are considered, but the most plausible is the expectation of a subsequent bid.

The paper is organised as follows. Section 2 of this paper is a discussion of Samuelson and Rosenthal's (1986) expected value hypothesis and related literature. Section 3 explains the methodology. Section 4 presents the data and results. Section 5 contains a discussion of factors, other than the probable bid outcome, which might also influence the target's share price during the offer period. Section 5 also examines empirically whether the probability of a subsequent bid appears to have influenced the offer period price behaviour of the failures. Section 6 contains the conclusions.

2. The Expected Value Hypothesis

Samuelson and Rosenthal (1986) hypothesise that for companies subject to a takeover bid the current share price is a function of the expected value of the share at the end of the bid. They further argue that at the end of a takeover offer, the target's share price should either converge with the price bid for the target $P_T$ or drop back to the fallback price $P_F$. Ignoring the time value of money, the EVH
can be written:

\[ P_d = q_d P_T + (1-q_d) P_F \]  \hspace{1cm} (1)

where \( P_d \) = the share price on day \( d \), and 
\( q_d \) = is the probability that the offer will be successful.

Rearranging this equation, the probability of success may be inferred:

\[ q_d = \frac{P_d - P_F}{P_T - P_F} \]  \hspace{1cm} (2)

Allowing for the time value of money requires that the current share price, compounded forward to the end of the bid, should equal the expected value at that date. Thus equation (2) becomes:

\[ q_d = \frac{P_d (1+r_d) - P_F}{P_T - P_F} \]  \hspace{1cm} (2A)

where \( r_d \) = the discount rate applicable from day \( d \) to the end of the bid.

Samuelson and Rosenthal (1986) suggest that the risk-free rate is appropriate to compound prices forward.\(^6\) The use of the risk-free rate is justified as follows. Holders of a target’s shares face two possible payoffs at the conclusion of the

\(^6\) In their study the U.S. 30-day treasury bill rate was used as a proxy for the risk-free rate.
takeover offer: \( P_T \) or \( P_F \). If these state payoffs are uncorrelated with the market, then the risk-free rate is suitable as the offer period required return. Samuelson and Rosenthal confirm empirically that the correlation between the outcome of the offer (success or failure) and changes in the market return was not significantly different from zero.\(^7\)

In their empirical work, Samuelson and Rosenthal (1986) found that, as hypothesised, the successes' share prices drifted upward to converge with the bid price, reflecting a gradually increasing probability of success as the bid progressed towards the conclusion date. The failures in their sample experienced an initial upward price reaction which was followed by a gradual reduction in price, reflecting a gradually decreasing probability of success. Samuelson and Rosenthal also found that equation 2A provided estimates of the probability of bid success which became increasingly accurate as the bid progressed.

In a similar study to Samuelson and Rosenthal (1986), Brown and Raymond (1986) also found that the successes' share prices converged to the bid price. However, for the failures the initial price reaction was not as large as in Samuelson and Rosenthal's study, and the gradual reduction in price as the bid progressed did not occur.

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\(^7\) Note that there is a weakness in this argument. Although the state of the outcome may not be correlated with the market, the magnitude of the outcome may be. It is possible that the fallback price and even the bid price will be influenced by the state of the market.
In contrast to both Samuelson and Rosenthal (1986) and Brown and Raymond (1986), Bradley (1980) argues that the target shareholders will reject the current bid if they anticipate a higher subsequent bid. If this is the case, the target’s share price will exceed the rejected offer price. Therefore an increase in the target’s share price can indicate failure of the bid. Bradley’s empirical results confirmed his argument. On average the failure’s share price exceeded the bid price within a few days of the takeover announcement.

The thrust of the work by Samuelson and Rosenthal (1986) and to a lesser extent Brown and Raymond (1986) is that the current bid and the probability of success of the takeover are the main systematic determinants of the target’s share price. However, Bradley’s (1980) work suggests that the probability of subsequent bids is likely to be a major systematic determinant of the share price of targets subject to a failed offer.

3. Methodology

The model presented by Samuelson and Rosenthal (1986) has some limitations. A crucial assumption of their work is that the fallback price \( P_f \) is less than the bid price \( P_T \), and that the offer period share price \( P_d \) of a target remains within the range \( P_f \leq P_d \leq P_T \). One problem that arises is that the fallback price is unobservable for the targets of bids which succeed, but without a fallback price it
is not possible to use equation 2A to estimate the probability of the bid succeeding. Samuelson and Rosenthal solve this problem by estimating expected fallback prices for the successes. For this purpose, they use a regression equation estimated from the observed data for failures. This approach assumes that the successes' price behaviour would have been the same as the failures' price behaviour, had the successes instead failed. The results Samuelson and Rosenthal obtained imply that the fallback price is greater than the price at which the target was trading prior to the bid.

A second, and major, problem with Samuelson and Rosenthal's methodology is that the daily share prices of takeover targets during the bid may not remain within the bounds $P_r$ to $P_T$. A violation of the lower bound, $P_r$, results in a meaningless implied probability of bid success ($q_d$) of less than zero. If the target's price exceeds the offer price, $P_T$, this results in a probability of bid success greater than one.

Two problems were encountered in attempting to apply the Samuelson and Rosenthal methodology. The first was that after necessary filtering of the data (see section 4 of the paper), only 16 failures remained in the data set. This was judged an insufficient number of observations to estimate a reliable model for the fallback price. It was also observed that some share prices violated the price boundaries, discussed above, which are implicit in the expected value equation. It seemed undesirable to eliminate the cases that violated those boundary conditions.
Such deletions would not only further deplete the data set, but more importantly they would bias the experiment in favour of the expected value hypothesis.

Therefore, instead of probabilities, standardised target prices were calculated in the following way:

\[ x_d = \frac{P_d(1+r_{fd}) - P_I}{P_T - P_I} \] (3)

where

- \( x_d \) is the standardised share price on day \( d \) during the offer period,
- \( P_d \) is the daily share price,
- \( P_T \) is the offer price,
- \( P_I \) is the initial price, as at two weeks prior to announcement of the takeover offer,\(^8\) and
- \( r_{fd} \) is the risk-free rate applicable to the period day \( d \) to conclusion.\(^9\)

The result of equation (3) is that prices are standardised, such that \( x_d \) is zero when the compounded value of the daily share price \( P_d(1+r_{fd}) \) is equal to the initial price, and \( x_d \) is one when \( P_d(1+r_{fd}) \) is equal to the bid price. The standardised price can also be interpreted as a percentage measure of the extent to which the offer premium has been incorporated into the share price by day \( d \).

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\(^8\) On the basis of Samuelson and Rosenthal’s (1986) results, \( P_I \) is less than \( P_T \). Thus prices are expected to always plot above \( P_T \).

\(^9\) The use of the risk-free rate as the compound factor may not be strictly valid, as described in footnote 7. However, the compounding adjustment is not expected to alter the daily share prices substantially, due to the relatively short duration of takeover offers. The average duration of the offer period for the sample is 90.2 days, with a standard deviation of 30 days.
The bid period for each takeover will of course vary considerably. This is dealt with by dividing the bid period into two sub-periods:

(1) the post-announcement period, being the 30 trading days immediately after the offer, and

(2) the pre-conclusion period, which is the final 30 trading days before the outcome of the offer is publicly known.

For the success group and the failure group, cross-sectional averages and medians for \( x_a \) are calculated for each day of the post-announcement and pre-conclusion periods.

If Samuelson and Rosenthal’s (1986) expected value hypothesis is correct, then the average share price for successes would be expected to drift upwards over the bid period. This reflects an increased probability of success, with the share price converging to the bid price by the end of the bid. The standardised price \( (x_a) \) of the successes should, therefore, drift upwards over the bid and converge to one by the end of the pre-conclusion period.

A reducing probability of success for the failures would, under the expected value hypothesis, be indicated by a declining average share price, converging towards the fallback price by the conclusion of the bid period. The standardised prices \( (x_a) \)
of the failures should, therefore, tend to drift down over the bid period, following a path which is bounded by one above and zero below.

Graphs of the standardised average and median offer period prices are presented in section 4. Median standardised prices are included to check that the results are not being driven by outliers.

4. Data and Results

The Centre for Independent Studies (CIS) takeover database, used by Bishop, Dodd and Officer (1987), encompasses 390 takeover attempts during the period November 1977 to June 1985. Preliminary data were drawn from this database. Much of the data was cross-checked with information from the weekly column "Current Takeovers" in the Australian Financial Review. Daily share price data were drawn from the Australian Financial Review's share price listings.

Following Samuelson and Rosenthal (1986), the following cases were omitted from the study:

(1) Those bids which were not 100% cash, omitted due to the difficulty of valuing a non-cash bid. There were 85 cases in this category (22%).
(2) Those bids which did not attempt to take the bidding firm to 100% ownership. Success is therefore defined as the acceptance of at least 90% of outstanding shares, at which level the acquirer may proceed to compulsory acquisition of the remaining shares. Partial bids were excluded because in these cases the payoff at conclusion of the bid may be a varying mixture of the bid price and the market price at conclusion of the bid. There were 51 partial offers (13%).

(3) Contested bids, omitted due to the difficulty of delineating share price effects among the alternate offers. There were 75 contested bids (19%).

(4) Bids which were resolved within 30 working days. As described in Section 3, two thirty-day sub-periods are extracted from each firm’s bid period. The minimum duration for inclusion in the sample is therefore 30 days; in such a case the price data in the post-announcement and pre-conclusion periods are the same. For bid period durations of less than 60 days, some overlap between the two periods will occur. In 9 cases the bid was resolved within 30 days (2%).

(5) Those bids for which the outcome was indeterminate, due to insufficient data on acceptances in the CIS database or the Australian Financial Review. Forty cases were omitted for this reason (10%).
(6) Cases where the bid price was less than 15% above the initial price. This was an insufficient range for price movement during the bid period. This occurred in 23 cases (6%).

This filtering process eliminated 283 cases, or 73% of the original sample.

Further, Part C offers had to be eliminated. Being on-market bids, any trade would be either at the bid price or higher. Therefore the probability of success of the bid would not affect the share price in the same way as it would a Part A offer. There were 16 Part C offers.\(^9\)

The final sample consists of 91 takeover targets; 75 successes and 16 failures.\(^11\)

For reasons of data availability, the 90-day bank bill rate was used as a proxy for the risk-free rate, rather than the rate for treasury notes.\(^12\)

In the course of the study it became apparent that some firms were not trading during the bid period. Volume data, published in the *Australian Financial Review*, was used to determine the date upon which each target’s shares were last traded. It was discovered that five of the successes, and one failure, did not trade for the

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\(^9\) The terms Part A and Part C refer to the legal documents associated with the bid. In a Part C bid the bidding firm sets a price and a period over which they will purchase the shares offered to them in the stock market. In a Part A bid, the bidder makes a conditional offer to purchase direct from the individual shareholders.

\(^11\) This is comparable with the total of 109 in Samuelson and Rosenthal’s (1986) study.

\(^12\) As explained in footnote 9, the choice of discount rate is unlikely to affect the results.
entire bid period. However, these cases did provide some price information arising from changes in bid-ask quotes.\textsuperscript{13} The analysis of prices was undertaken both including and excluding these non-trading cases. The substance of the results was the same. Because of this similarity in results, only the results for the full sample of targets is presented.

4.1 Targets Successfully Acquired

Figure 1 shows the standardised average and median prices for the successes. On the day of announcement of the takeover, the average price increases by about 35\% of the offer premium. The average price then drifts upwards during the course of the bid. However, as can be seen, the average daily price does not converge with the offer price at the end of the pre-conclusion period (day -1) as was anticipated. Convergence occurred in only 19 of the 75 cases (25\%).

\textsuperscript{13} The \textit{Australian Financial Review} reports the price of the last trade except in cases where there is a higher bid, or a lower ask.
The lack of convergence in Figure 1 appears to be inconsistent with Samuelson and Rosenthal (1986), but such graphics can give a misleading impression of statistical significance. A formal test of significance is therefore supplied by the Wilcoxon matched pairs signed ranks test in Table 1. Under the EVH the price of the successes, compounded to the end of the bid period, should not exceed the bid price, and should have converged to the bid price by the end of the bid period.\(^\text{14}\)

\(^{14}\) In the statistical testing it was convenient to use the compounded price, \(P_f(1+r_{ib})\), rather than the standardised price, \(x_{fr}\). However, the results are equivalent. Testing whether the compounded price is equal to the bid price is equivalent to testing whether the standardised price is equal to one. The same method was used for the analyses presented in Tables 3, 4 and 5.
We test the following:¹⁵

Part 1. \[ H_0: \quad P_d(1 + r_{fd}) \leq P_T \quad \text{for } d \neq -1 \]

\[ H_A: \quad P_d(1 + r_{fd}) > P_T \]

Part 2. \[ H_0: \quad P_d = P_T \quad \text{for } d = -1 \]

\[ H_A: \quad P_d \neq P_T \]

The first part of the hypothesis is directional and therefore involves a one-tailed test. The second part is non-directional and therefore involves a two-tailed test. Thus, in Table 1 we identify which significance levels are one-tailed probabilities and which are two-tailed probabilities. The row labelled non-zero differences indicates the effective number of observations on which the Wilcoxon statistic is based.

In constructing the test, prices for each target successfully acquired were observed

¹⁵ Strictly speaking, since we are using a non-parametric test we are testing the relative locations of the distributions of \( P_d(1 + r_{fd}) \) and \( P_T \), rather than specific parameters of those distributions.
at the beginning, middle and end of both the post-announcement and pre-conclusion periods. The prices were then compounded forward to the end of the bid period and compared with the target’s bid price.\textsuperscript{16}

Table 1 shows that there was no significant evidence of prices exceeding the bid price; rather the reverse. Failure to converge with the bid price was significant at the 1\% level. In interpreting these results some caution is necessary. Because of data limitations, and to be consistent with Samuelson and Rosenthal (1986), we only adjust for the time value of money for the period of the bid. Implicitly this assumes that the bidder pays for the shares immediately the bid concludes. Given a delay in payment exact convergence would not be expected by the end of the bid. However, the effect of most payment delays would likely be too small to explain the discount to the bid price that we observe. As discussed below, a more likely explanation for the discount is that stale prices were a problem during the pre-conclusion period.

\textsuperscript{16} We test for a subset of days, rather than every day in order to reduce the problem of multiple comparisons inflating the experimental error rate. In order to provide a measure of the overall significance of the comparisons, the Friedman non-parametric analysis of variance was used. The Friedman test was applied to a data set consisting of the bid price together with the prices observed at the beginning, middle and end of the post-announcement and pre-conclusion periods. This procedure was used in relation to the comparisons in Tables 1, 3, 4 and 5. The Friedman test indicated significant differences (two-tailed) at better than the 1\% level for tables 1 and 3, and at the 3\% and 2\% levels for Tables 4 and 5 respectively.
The volume data presented in Figure 2 provides a plausible explanation for the failure to observe convergence with the bid price. By the start of the pre-conclusion period (day -30) almost half of the non-converging cases had stopped trading.

![Proportion of Successes Continuing to Trade](image)

**Figure 2.** Proportion of Successes Continuing to Trade

Figure 2 was constructed by observing the number of days before the end of the bid period that each success ceased to trade. The sample of successes was then split into two groups. One group where the price was observed to converge to
the bid price - the converging cases, and a second group where the price was not observed to converge to the bid price - the non-converging cases. The proportions of each group continuing to trade were then calculated for each day of the pre-conclusion period.\textsuperscript{17}

In both groups there is a steady decline in the proportion of companies still trading, as the bid progresses. However, the decline is more rapid for the non-converging cases. By day -28, less than 50% of the non-converging cases still trade, while for the converging cases more than 50% are still trading until the penultimate day of the bid. Table 2 presents the results of a two-tailed test of proportions.\textsuperscript{18} The table shows that by day -30 the differences in proportion were significant at the 7% level, and were highly significant thereafter.

<table>
<thead>
<tr>
<th>TABLE 2. PROPORTIONS OF SUCCESSES CONTINUING TO TRADE</th>
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<tbody>
<tr>
<td>DAYS PRIOR TO END BID PERIOD</td>
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<tr>
<td>-------------------------------</td>
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<tr>
<td>NON-CONVERGING CASES</td>
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<tr>
<td>STILL TRADING</td>
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<tr>
<td>CONVERGING CASES</td>
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<tr>
<td>STILL TRADING</td>
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<tr>
<td>PROPORTION TEST (Z)</td>
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<tr>
<td>SIGNIFICANCE LEVEL</td>
</tr>
</tbody>
</table>

(Two tailed)

Total Non-converging cases = 56  Total Converging Cases = 19

\textsuperscript{17} As noted earlier, five successes did not trade for the entire bid. These were all members of the non-converging group.

\textsuperscript{18} We use a two-tailed test here because the direction of the difference between the groups was suggested by the data, not by pre-existing theory or pre-existing empirical evidence.
Takeover Bids, Share Prices, and the Expected Value Hypothesis

The early cessation of trading for the successes was an unexpected result. An interesting question is whether this is due to substantial acceptance of the bid prior to its conclusion. At first sight such early acceptances would diminish the value to target shareholders of any option embedded in the bid. However, as we argue in section 5, in the cases of the bids studied, there was no embedded option available to individual shareholders.

Transactions costs may also have inhibited trading. Consider the case where both the target’s shareholders and potential buyers agree on the value of the share. The shareholders will not wish to sell for a price less than that value plus transactions costs, while the buyers will not wish to offer more than the value less transactions costs. The spread between prices offered and asked will mean that no trades occur, unless a shareholder is forced to sell for liquidity reasons. Over the course of a bid, therefore, trades generally arise because buyers and sellers place different values on the share. These different valuations may arise because of differing expectations regarding the probability of bid success, the fallback price, or even the bid price in cases where revision of the bid is a possibility. As the probability of bid success approaches 1, these divergent expectations converge. When the probability of success is 1 then the fallback price becomes irrelevant, the bid price is given, and thus both buyers and sellers place the same valuation on the share.19 Then, holders of the target’s shares will only sell at a price that is equal to the present value of the bid plus transactions costs. Otherwise they

19 We assume here that both buyers and sellers use the same discount rate.
would be better off accepting the bid.\textsuperscript{20} For buyers, it is only worthwhile to offer the present value of the bid less transactions costs. As a consequence of this spread trading ceases.

In cases where the probability of failure is 1, buyers and sellers will not necessarily agree on the valuation because the fallback price is uncertain. Therefore trades are likely to continue throughout the bid.

4.2 Targets Where the Bid Failed

Figure 3 shows the standardised average and median prices for the failures. On the first day of the offer period the daily share price had increased an average of 50\% of the bid premium. Within a few days the standardised price exceeded 1; that is, the average daily share price was greater than the average bid price. This persisted for most of the bid period, with the price dropping to about the average bid price at the end of the period.

\textsuperscript{20} Even liquidity motivated sellers would be better off borrowing against the proceeds of the bid, rather than selling.
Figure 3. Mean and Median Standardised Prices - Failures

The hypothesised behaviour under Samuelson and Rosenthal’s (1986) expected value hypothesis is that the failures should trade below the bid price, with prices dropping back to the fallback price by the end of the bid.

We test

\[ H_0: \ P_d (1 + r_{fd}) \geq P_T \]

\[ H_A: \ P_d (1 + r_{fd}) < P_T \quad \text{for all} \ d. \]

The Wilcoxon test in Table 3 shows that \( H_A \), the hypothesised behaviour under the
EVH, is only accepted on day 1. The price starts on day 1 significantly below the bid price. However, for the rest of the observations the price is not significantly less than the bid price. Indeed, had we followed Bradley (1980) and therefore reversed direction of the a-priori hypothesis, then the price on day 30 would have been judged significantly above the bid price at the 3% significance level (one-tailed test).21

<table>
<thead>
<tr>
<th>TABLE 3: FAILURES WILCOXON TEST</th>
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<td></td>
</tr>
<tr>
<td>SUM OF POSITIVE</td>
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<tr>
<td>RANKS (bid - price)</td>
</tr>
<tr>
<td>NON-ZERO VALUES</td>
</tr>
<tr>
<td>SIGNIFICANCE LEVEL (One tailed)</td>
</tr>
</tbody>
</table>

Figure 4 shows that in contrast to the successes, trading in most of the failures did not cease until the end of the bid period.

![Figure 4. Proportion of Failures Continuing to Trade](image)

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21 Deleting the failure that did not trade, and assuming the direction of the a-priori hypothesis was reversed, then on day 15, day 30 and day -15, price is significantly above the bid price at 3%, at better than 1%, and at 4% significance levels respectively (one-tailed tests).
5. Other Possible Influences on the Target Share Price

The results above, particularly for the failures, are inconsistent with the expected value hypothesis. The hypothesis may be too simple an explanation of the target’s share price behaviour. There are several other factors which may systematically affect a target’s share price. These can be divided into two groups.

5.1. Bid Period-Only Factors

These factors are not expected to persist beyond the conclusion date of the takeover. Possibilities are:

(a) The probability of a revision of the bid price by the offeror. To account for this the final price offered was used as the measure of the bid price $P_T$.

(b) The probability of a contesting bid. Samuelson and Rosenthal (1986) omitted cases where the bid was contested for this reason. However, they did not consider the possibility of the incorrect anticipation of competing offers. This may be a factor even if a contest does not materialise.

(c) Buying by a ‘white knight’, as suggested by Hathaway (1990).
(d) An option is embedded in the target share. This was found to be the case for targets subject to partial offers, by Bhagat, Brickley and Loewenstein (1987) and Hathaway (1990). However, it is arguable that no option exists for individual shareholders in the cases of bids for 100% of the target. If the bidding firm achieves 90% acceptance, they can proceed to compulsory acquisition of the remaining 10% of the shares. If the bidder fails to achieve the level of acceptance specified as a condition of the bid, the bid can be withdrawn. Thus, shareholders have an option only if they act co-operatively in their acceptance or rejection of the bid. Early acceptance of a bid could therefore make some sense, if it provided a means for better informed investors, or investors with large shareholdings, to signal their belief in the bid to less well-informed investors or small investors, in the hope of inducing co-operative exercise of the shared option.

5.2. Longer-Term Factors

The effects of these factors may persist beyond the conclusion of the bid.

(a) The release of additional information to the market which is somehow precipitated by the takeover. Dodd (1980), Dodd and Ruback (1977), and Bishop, Dodd and Officer (1987) suggested this
possibility.

(b) The market perceives improved performance by incumbent management resulting from the threat of takeover. Dodd and Ruback (1977) concluded that this factor was paramount in accounting for the retention of abnormal returns by failures. Bishop, Dodd and Officer (1987) concluded that "there is no doubt that the share buying of ... (bidders) ... makes incumbent management rush to self-evaluation. Often the mere taking of a position ... triggers substantial internal reorganisation of personnel and restructuring of real assets." (p. 16).

(c) The probability of a subsequent bid if the current bid fails. Bradley, Desai and Kim (1983) and Fabozzi et al (1985) concluded that this was why the cumulative abnormal returns of failures remained high post Offer. Bishop, Dodd and Officer (1987) suggested this a possible explanation for the same phenomenon. It was Bradley’s (1980) major finding that the current bid will fail if investors perceive a substantial probability of a subsequent higher-priced offer. The expectation of a subsequent bid may be a factor even in cases where no subsequent bid materialises.
5.3 Which Other Factors are Relevant?

While any of the four possible ‘offer period events’ may contribute to the increase in the offer period share price of the failures, they cannot account for it completely. At conclusion date, the average stock price for the failures retains approximately 95% of the offer premium, and the median price is equal to the bid price. Two weeks subsequent to conclusion, an average of 64% of the offer premium is retained. Most of the price increase must therefore be accounted for by at least one of the three longer-term explanations: probability of a subsequent bid, release of new information, or improved performance by management.

Bradley, Desai and Kim (1983) found that for targets of unsuccessful offers, which were not subsequently taken over within five years, the cumulative abnormal return during the year following the bid was substantially negative. For the same period the average abnormal return for subsequently-taken-over firms was 15.63%. Fabozzi et al (1988) found that for failures not subsequently taken over within one year, the abnormal returns earned around announcement were virtually wiped out before the conclusion of the offer. These results are strongly in favour of the ‘probability of subsequent takeover’ hypothesis, and against both the ‘information’ and ‘improved management’ hypotheses. We therefore investigate whether for failures the observed price increase above the bid price is driven by subsequent bids.
In order to conduct a test the failures are divided into two groups:

(1) targets subject to a subsequent takeover bid, and
(2) those not subsequently bid for within 5 years.

Group (1) comprises 9 target firms; group (2) comprises 7 firms.

Graphs of the average and median standardised prices for each group appear in Figures 5 and 6.

**Figure 5.** Mean and Median Standardised Prices - Failures Subject to Subsequent Offer
Figure 6. Mean and Median Standardised Prices - Failures  
Not Subject to Subsequent Offer

There is a marked difference in the average price behaviour of the two groups. For the subsequent bid group, the average price on day 1 increases by 75% of the offer premium, and then rises above the average bid price where it remains for the course of the bid. The no subsequent bid group exhibits quite different average price characteristics. The initial price reaction is much smaller than for the subsequent bid firms, at approximately 20% of the premium. Further, for this group the price drops sharply to about the bid price as the end of the bid period approaches.
For both groups of failures, the Wilcoxon statistic is used to test the hypothesis that the price is above the bid price.

We test

\[ H_0: P_d(1 + f_d) \leq P_T \text{ for all } d \]

\[ H_A: P_d(1 + f_d) > P_T \]

Table 4 presents the results for the subsequent bid group, and Table 5 presents the results for the no subsequent bid group\(^{22}\). Where there was a subsequent bid, the price on day 1 was not significantly above the bid price. Thereafter, the price rises above the bid price and is significant at the 1% level, before falling back to be insignificantly different from the bid price by the end of the bid period.

<table>
<thead>
<tr>
<th>TABLE 4. FAILURES WITH A SUBSEQUENT BID WILCOXON TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>POST ANNOUNCEMENT</td>
</tr>
<tr>
<td>SUM OF POSITIVE RANKS (bid - price)</td>
</tr>
<tr>
<td>NON-ZERO VALUES</td>
</tr>
<tr>
<td>SIGNIFICANCE LEVEL (One tailed)</td>
</tr>
</tbody>
</table>

Where there was no subsequent bid, the price was never significantly greater than the bid price.

\(^{22}\) Although the sample sizes are small, they meet the requirement for the Wilcoxon matched pairs signed rank test that \( n \geq 5 \).
### TABLE 5. FAILURES WITH NO SUBSEQUENT BID WILCOXON TEST

<table>
<thead>
<tr>
<th>Post Announcement</th>
<th>Day 1</th>
<th>Day 15</th>
<th>Day 30</th>
<th>Pre Conclusion</th>
<th>Day -30</th>
<th>Day -15</th>
<th>Day -1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum of Positive</td>
<td>28</td>
<td>16</td>
<td>12</td>
<td>19</td>
<td>13</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Ranks (bid - price)</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Non-zero values</td>
<td>0.99</td>
<td>0.59</td>
<td>0.41</td>
<td>0.76</td>
<td>0.47</td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td>(One tailed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Conclusion

It should be borne in mind that the sample used in empirical testing was the product of substantial filtering and was based on Australian data. Some care must therefore be exercised in drawing general inferences from the results. However, the purpose of the filtering was to provide the best opportunity to observe price behaviour consistent with Samuelson and Rosenthal’s (1986) expected value hypothesis, if bids did indeed conform to that hypothesis. Failure to observe such behaviour is therefore quite strong evidence for not accepting the hypothesis. The results with regard to the failures are consistent with Bradley (1980) and are therefore strengthened by this triangulation.

In general, the price of targets where the bid succeeded was observed to rise during the bid, but did not converge to the bid price by the conclusion of the bid. The price of targets where the bid failed was observed to rise rapidly to the bid price and above. Therefore, an increase in a target’s share price may indicate an increased probability of either success or failure, depending upon the speed and extent of the price rise.
In the cases of the successes, the failure to observe convergence with the bid price appears to be due to the early cessation of trading for many of the successes. A possible explanation for this early cessation of trading is a substantial acceptance of the offer in advance of the conclusion of the bid, but transactions costs may also have a role to play in limiting trades. This appears to be an issue worthy of further investigation. Another interesting question is whether similar volume behaviour is present in markets in other countries. It also seems appropriate to suggest that future studies of price behaviour during takeover bids should consider whether there are trades supporting the price data.

In the case of the failures, the increase in price above the bid price appears to have been substantially influenced by the expectation of a subsequent bid. Failures where a subsequent bid eventually occurred were observed to have experienced price rises significantly above the bid price, whereas for the failures where there was no subsequent bid the price was never significantly greater than the bid price. Early cessation of trading was not observed for a majority of the failures.
References


